Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application.

Claims 1-49 (Cancelled)

50. (New) A composition comprising:

(a) a non-naturally occurring molecular scaffold comprising:

(i) a core particle selected from the group consisting of:

(1) a core particle of non-natural origin; and

(2) a core particle of natural origin; and

(ii) an organizer comprising at least one first attachment site, wherein said organizer is connected to said core particle by at least one covalent bond; and

(b) an antigen or antigenic determinant with at least one second attachment site, said second attachment site being selected from the group consisting of:

(i) an attachment site not naturally occurring with said antigen or antigenic determinant; and

(ii) an attachment site naturally occurring with said antigen or antigenic determinant,

wherein said second attachment site is capable of association through at least one non-peptide bond to said first attachment site; and

wherein said antigen or antigenic determinant and said scaffold interact through said association to form an ordered and repetitive antigen array;

wherein said antigen is selected from proteins suited to induce an immune response against allergens.

51. (New) The composition of Claim 50, wherein:

(a) said core particle is selected from the group consisting of:

(i) a virus

(ii) a virus-like particle;

(iii) a bacteriophage;

(iv) a viral capsid particle; and

(v) a recombinant form of (i), (ii), (iii) or (iv); and

(b) said organizer is a polypeptide or residue thereof; and

(c) said second attachment site is a polypeptide or residue thereof.

52. (New) The composition of Claim 51, wherein said first and/or said second attachment sites comprise:

(a) an antigen and an antibody or antibody fragment thereto;

(b) biotin and avidin;

(c) strepavidin and biotin;

(d) a receptor and its ligand;

(e) a ligand-binding protein and its ligand;

(f) interacting leucine zipper polypeptides;

(g) an amino group and a chemical group reactive thereto;

(h) a carboxyl group and a chemical group reactive thereto;

(i) a sulfhydryl group and a chemical group reactive thereto; or

(j) a combination thereof.

53. (New) The composition of Claim 52, wherein said second attachment site does not naturally occur with said antigen or antigenic determinant.

54. (New) The composition of Claim 51, where in said core particle is a recombinant alphavirus.

55. (New) The composition of Claim 54, wherein said recombinant alphavirus is Sindbis virus and said first attachment site and said second attachment site each comprise an interacting leucine zipper polypeptide.

56. (New) The composition of Claim 55, wherein said first attachment site and said second attachment site are the JUN and/or FOS leucine zipper polypeptides.

57. (New) The composition of Claim 51, wherein said core particle is a virus-like particle.

58. (New) The composition of Claim 57, wherein said first attachment site is an amino group and said second attachment site is a sulfhydryl group.

59. (New) The composition of Claim 57, wherein said virus-like particle is a hepatitis B virus capsid protein.

60. (New) The composition of Claim 59, wherein said first attachment site and said second attachment site each comprise an interacting leucine zipper polypeptide.

61. (New) The composition of Claim 60, wherein said first attachment site is the JUN polypeptide and said second attachment site is the FOS polypeptide.

62. (New) The composition of Claim 59, wherein said first attachment site is a lysine residue and said second attachment site is a cysteine residue.

63. (New) The composition of Claim 57, wherein said virus-like particle is a Measles virus capsid protein.

64. (New) The composition of Claim 63, wherein said first attachment site and said second attachment site each comprise an interacting leucine zipper polypeptide.

65. (New) The composition of Claim 64, wherein said first attachment site and said second attachment site are the JUN and/or FOS leucine zipper polypeptides.

66. (New) The composition of Claim 51, wherein said core particle is selected from the group consisting of:

(a) recombinant proteins of Rotavirus;

(b) recombinant proteins of Norwalk virus;

(c) recombinant proteins of Alphavirus;

(d) recombinant proteins of Foot and Mouth Disease virus;

(e) recombinant proteins of Retrovirus;

(f) recombinant proteins of Hepatitis B virus;

(g) recombinant proteins of Tobacco mosaic virus;

(h) recombinant proteins of Flock House Virus; and

(i) recombinant proteins of human Papilomavirus.

67. (New) The composition of Claim 66, wherein the first attachment site and the second attachment site each comprise an interacting leucine zipper polypeptide.

68. (New) The composition of Claim 66, wherein said first attachment site is an amino group and said second attachment site is sulfhydryl group.

69. (New) The composition of Claim 50, where in said core particle is of non-natural origin.

70. (New) The composition of Claim 69, wherein said core particle is selected from the group consisting of:

(a) synthetic polymer;

(b) a lipid micelle; and

(c) a metal.

71. (New) The composition of Claim 70, wherein said first attachment site and said second attachment site each comprise an interacting leucine zipper polypeptide.

72. (New) The composition of Claim 71, wherein said first attachment site and said second attachment site are the JUN and/or FOS leucine zipper polypeptides.

73. (New) The composition of Claim 50, wherein said antigen is:

(a) a recombinant protein of bee sting allergy;

(b) a recombinant protein of nut allergy;

(c) a recombinant protein of food allergies; or

(d) a recombinant protein of asthma.

74. (New) The composition of Claim 73, wherein the first attachment site and the second attachment site each comprise an interacting leucine zipper polypeptide.

75. (New) A process for producing a non-naturally occurring, ordered and repetitive antigen array comprising:

(a) providing a non-naturally occurring molecular scaffold comprising:

(i) a core particle selected from the group consisting of:

(1) a core particle of non-natural origin; and

(2) a core particle of natural origin; and

(ii) an organizer comprising at least one first attachment site,

wherein said organizer is connected to said core particle by at least one covalent bond; and

(b) providing an antigen or antigenic determinant with at least one second attachment site, said second attachment site being selected from the group consisting of:

(i) an attachment site not naturally occurring with said antigen or antigenic determinant; and

(ii) an attachment site naturally occurring with said antigen or antigenic determinant,

wherein said second attachment site is capable of association through at least one non-peptide bond to said first attachment site; and

(c) combining said non-naturally occurring molecular scaffold and said antigen or antigenic determinant;

wherein said antigen or antigenic determinant and said scaffold interact through said association to form an ordered and repetitive antigen array; and

wherein said antigen is selected from proteins suited to induce an immune response against allergens.

76. (New) The process of Claim 75, wherein

(a) said core particle is selected from the group consisting of:

(i) a virus;

(ii) a virus-like particle;

(iii) a bacteriophage;

(iv) a viral capsid particle; and

(v) a recombinant form of (i), (ii), (iii) or (iv); and

(b) said organizer is a polypeptide or residue thereof; and

(c) said second attachment site is a polypeptide or residue thereof.

77. (New) The process of Claim 76, wherein said first and/or said second attachment sites comprise:

(a) an antigen and an antibody or antibody fragment thereto;

(b) biotin and avidin;

(c) strepavidin and biotin;

(d) a receptor and its ligand;

(e) a ligand-binding protein and its ligand;

(f) interacting leucine zipper polypeptides;

(g) an amino group and a chemical group reactive thereto;

(h) a carboxyl group and a chemical group reactive thereto;

(i) a sulfhydryl group and a chemical group reactive thereto; or

(j) a combination thereof.

78. (New) The process of Claim 77, wherein said second attachment site does not naturally occur with said antigen or antigenic determinant.

79. (New) An isolated recombinant alphavirus comprising in its genome:

(a) a deletion of RNA packaging signal sequences; and

(b) a non-naturally occurring insertion of the *JUN* leucine zipper protein domain nucleic acid sequence in frame with said alphavirus' E2 envelope protein nucleic acid sequence.

80. (New) A host cell comprising the recombinant alphavirus of Claim 79.

81. (New) A method of treatment or prevention of allergies comprising administering to a subject the composition of Claim 50.

82. (New) A pharmaceutical composition comprising:

(a) the composition of Claim 50; and

(b) an acceptable pharmaceutical carrier.

83. (New) A method of immunization for the treatment or prevention of allergies comprising administering to a subject a composition comprising:

(a) a non-naturally occurring molecular scaffold comprising:

(i) a core particle selected from the group consisting of:

(1) a core particle of non-natural origin; and

(2) a core particle of natural origin; and

(ii) an organizer comprising at least one first attachment site;

wherein at least one said organizer is connected to said core particle by at least one covalent bond; and

(b) an antigen or antigenic determinant with at least one second attachment site, said second attachment site being selected from the group consisting of:

(i) an attachment site not naturally occurring with said antigen or antigenic determinant; and

(ii) an attachment site naturally occurring with said antigen or antigenic determinant;

wherein said second attachment site is capable of association through at least one non-peptide bond to said first attachment site;

wherein said antigen or antigenic determinant and said scaffold interact through said association to form an ordered and repetitive antigen array;

wherein said antigen is selected from proteins suited to induce an immune response against allergens; and

wherein said method is suitable for the treatment or prevention of allergies.

84. (New) The method of Claim 83, wherein said immunization produces an immune response.

85. (New) The method of Claim 83, wherein said immunization produces a humoral immune response.

86. (New) The method of Claim 83, wherein said immunization produces a cellular immune response.

87. (New) The method of Claim 83, wherein said immunization produces a humoral immune response and a cellular immune response.

88. (New) The method of Claim 83, wherein said immunization produces an immune response sufficient to prevent, treat or mitigate allergies.

89. (New) A vaccine composition for the prevention or treatment of allergies comprising:

(a) a non-naturally occurring molecular scaffold comprising:

(i) a core particle selected from the group consisting of:

(1) a core particle of non-natural origin; and

(2) a core particle of natural origin; and

(ii) an organizer comprising at least one first attachment site,

wherein at least one said organizer is connected to said core particle by at least one covalent bond; and

(b) an antigen or antigenic determinant with at least one second attachment site, said second attachment site being selected from the group consisting of:

(i) an attachment site not naturally occurring with said antigen or antigenic determinant; and

(ii) an attachment site naturally occurring with said antigen or antigenic determinant,

wherein said second attachment site is capable of association through at least one non-peptide bond to said first attachment site;

wherein said antigen or antigenic determinant and said scaffold interact through said association to form an ordered and repetitive antigen array;

wherein said antigen is selected from proteins suited to induce an immune response against allergens; and

wherein said vaccine composition is suitable for the treatment or prevention of allergies

90. (New) The vaccine composition of Claim 89 further comprising an adjuvant.

91. (New) The vaccine composition of Claim 89, wherein

(a) said core particle is selected from the group consisting of:

(i) a virus

(ii) a virus-like particle;

(iii) a bacteriophage;

(iv) a viral capsid particle; and

(v) a recombinant form of (i), (ii), (iii) or (iv); and

(b) said organizer is a polypeptide or residue thereof; and

(c) said second attachment site is a polypeptide or residue thereof.

92. (New) The vaccine composition of Claim 91, wherein said first and/or said second attachment sites comprise:

(a) an antigen and an antibody or antibody fragment thereto;

(b) biotin and avidin;

(c) strepavidin and biotin;

(d) a receptor and its ligand;

(e) a ligand-binding protein and its ligand;

(f) interacting leucine zipper polypeptides;

(g) an amino group and a chemical group reactive thereto;

(h) a carboxyl group and a chemical group reactive thereto;

(i) a sulfhydryl group and a chemical group reactive thereto; or

(j) a combination thereof.

93. (New) The vaccine composition of Claim 91, wherein said core particle comprises a virus-like particle.

94. (New) The vaccine composition of Claim 93, wherein said core particle comprises a Hepatitis B virus-like particle.

95. (New) The vaccine composition of Claim 93, wherein said core particle comprises a measles virus-like particle.

96. (New) The vaccine composition of Claim 92, wherein said core particle comprises a virus.

97. (New) The vaccine composition of Claim 96, wherein said core particle comprises the Sindbis virus.